Human Systems Integration (HSI) at NPS

A Presentation to the
MANPRINT Practitioner's Workshop

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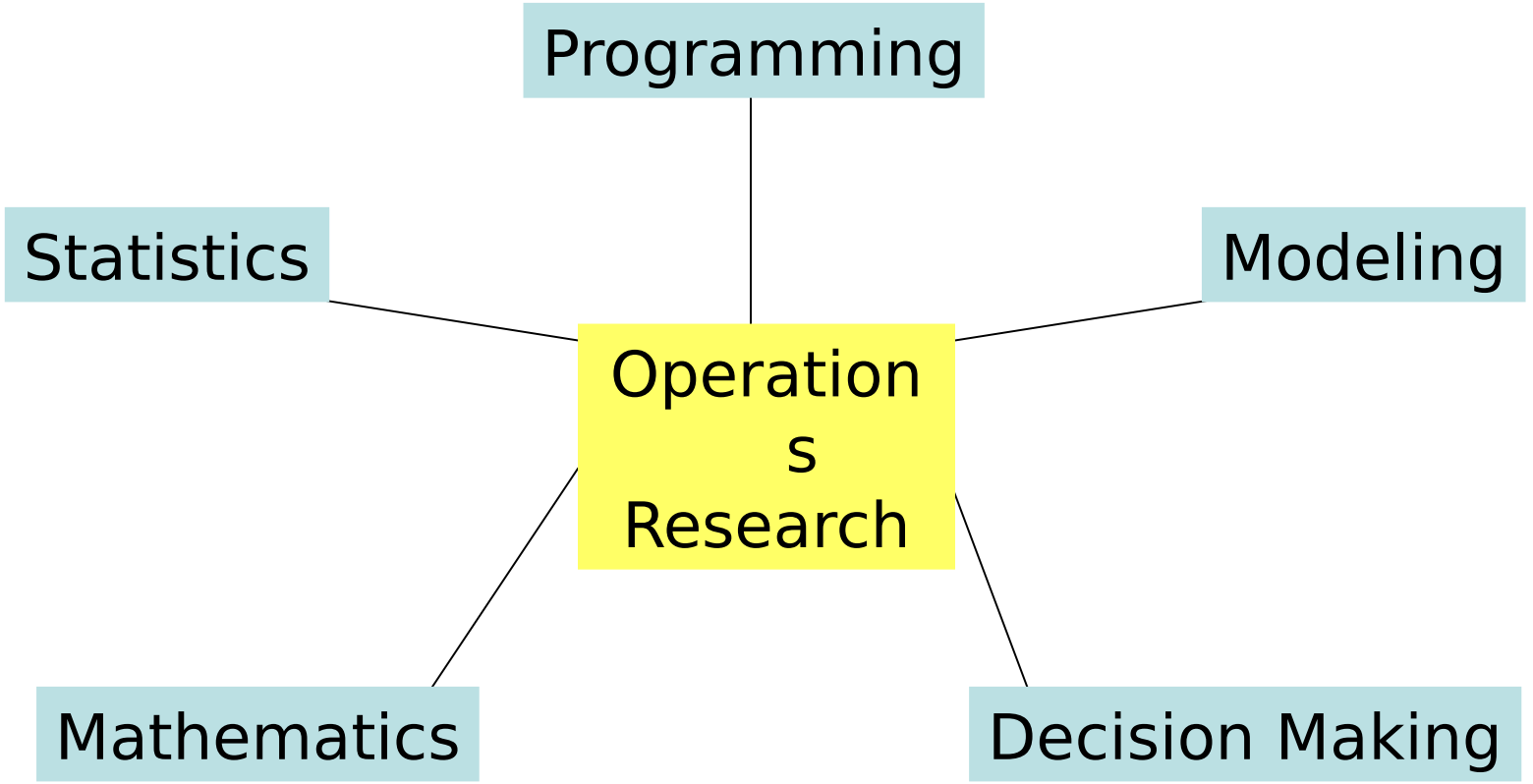
Agenda

- Background: The Army Connection
- Rationale for Interdisciplinary Degree
- Approach to NPS degree
  - Design space
  - Vision
  - Goals
- What the degree looks like now
- HSI Theses
- Interdisciplinary NPS involvement
- Who can attend NPS
- The path forward

HSI: The Army Connection

- Mr. Walt Hollis visits Feb 2001
- Drs. Hal Booher and Robin Keesee from ARL (HRED) described their “wish list”
- We get permission to offer the degree
- Jan 2004--7 students (4 Army civilians and 3 Naval officers)
- 1 Army civilian doctoral student

Human Systems Integration: A new discipline at the crossroads



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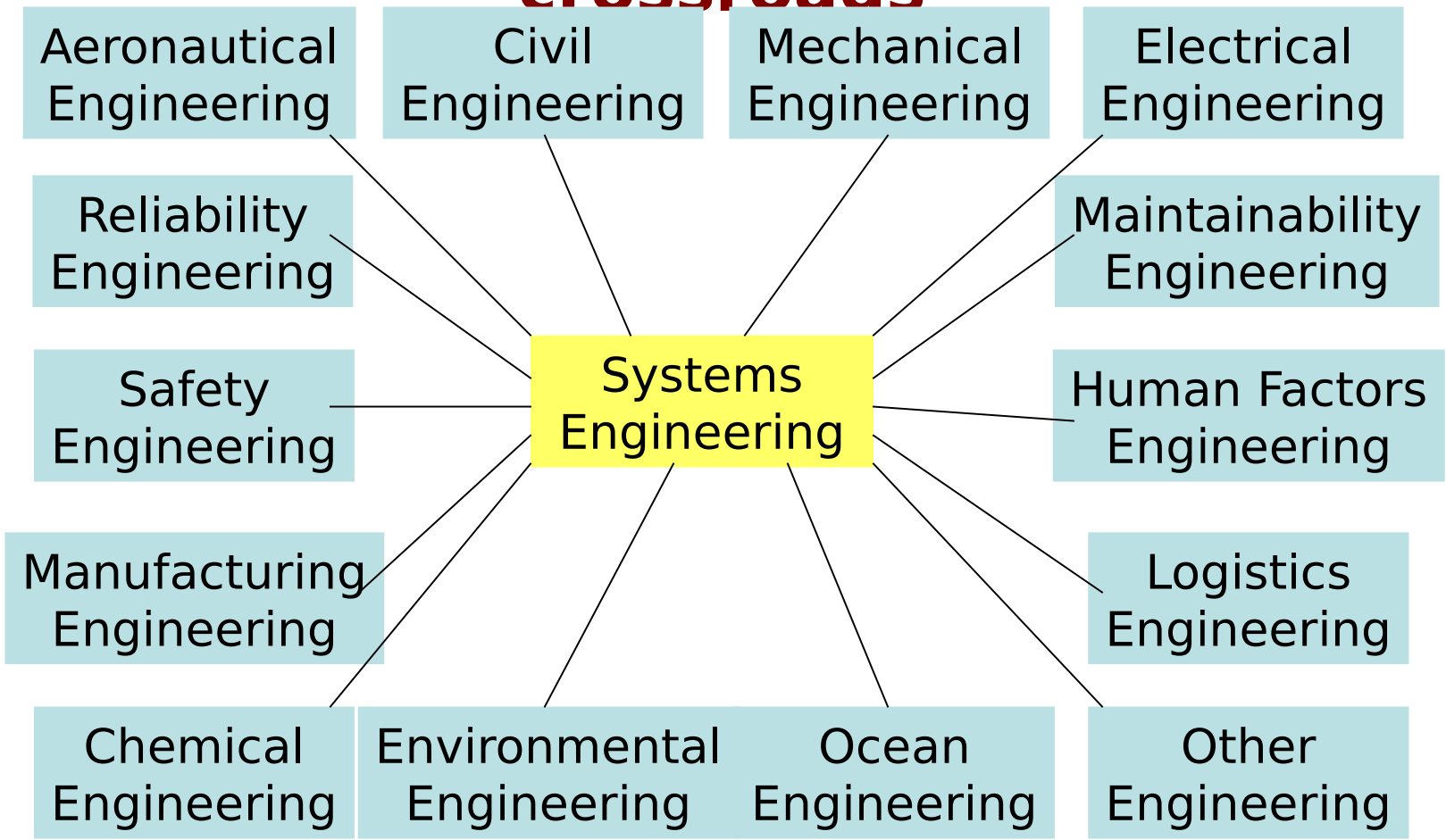

(Blanchard & Fabrycky, 199

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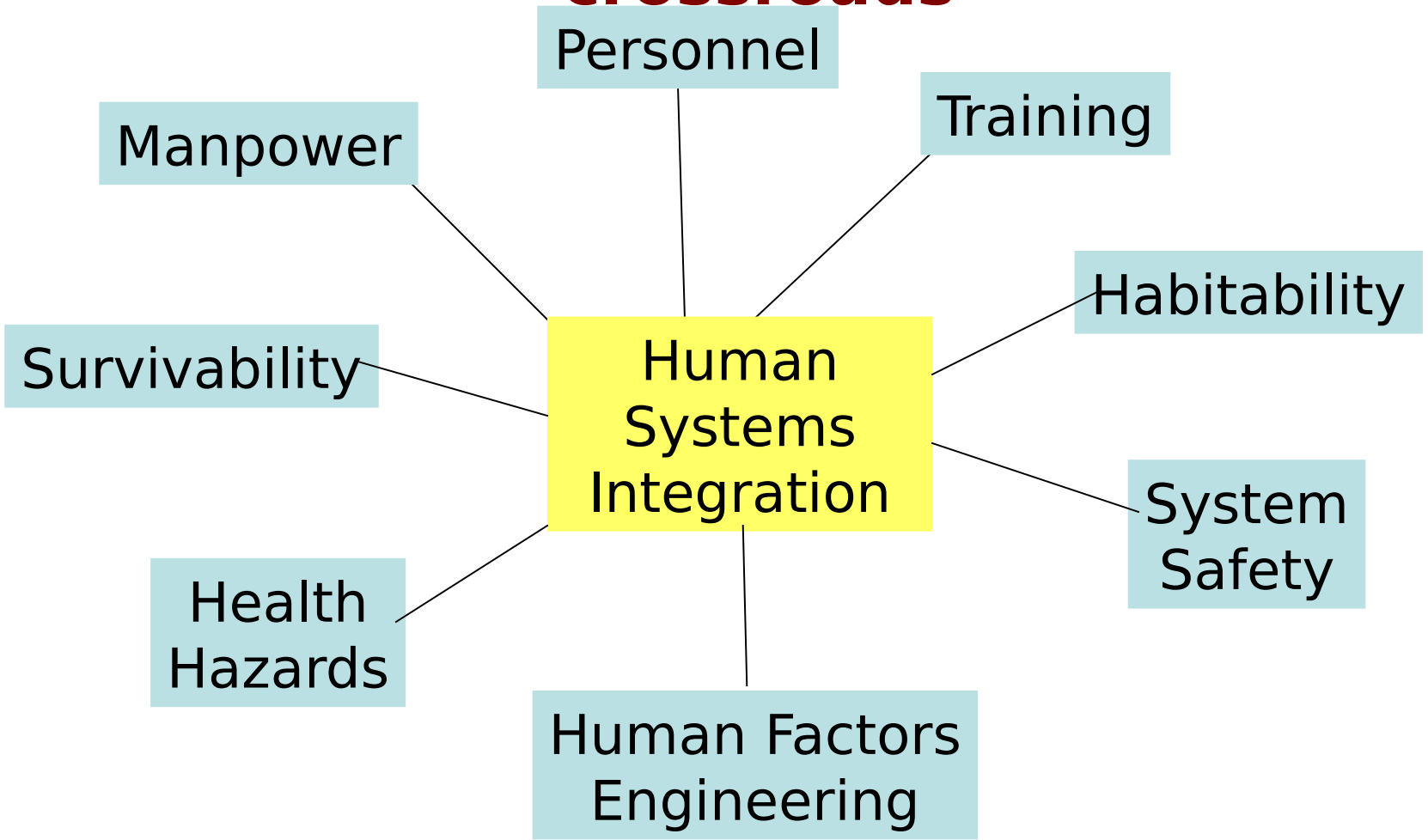


(Booher, 2003)

Human Systems Integration Definition

HSI is a comprehensive management and technical program that focuses on the integration of human considerations into the **systems acquisition** process.

Human Systems Integration (HSI) is based on the understanding that **people** (operators, maintainers and support personnel) are **critical elements** of the system and that a **human-centered design** perspective promotes **system effectiveness, safety and cost savings**.

HSI at NPS
Design Space

Theoretical ----------X------

Applied

Laboratory----------X----------

Field

Cognitive---------X----------

Physical

Behavioral Science---------X----------

Engineering

Small Systems---X—X—X—X—X—X---X---Large

HSI at NPS
Vision Statement

- Advocate a human-centered approach to the design, development and implementation of technological systems.

- Embrace the concept that the human is the most valuable, but most variable, component in a system.

HSI Program Goals

Graduates of this program will be able to:

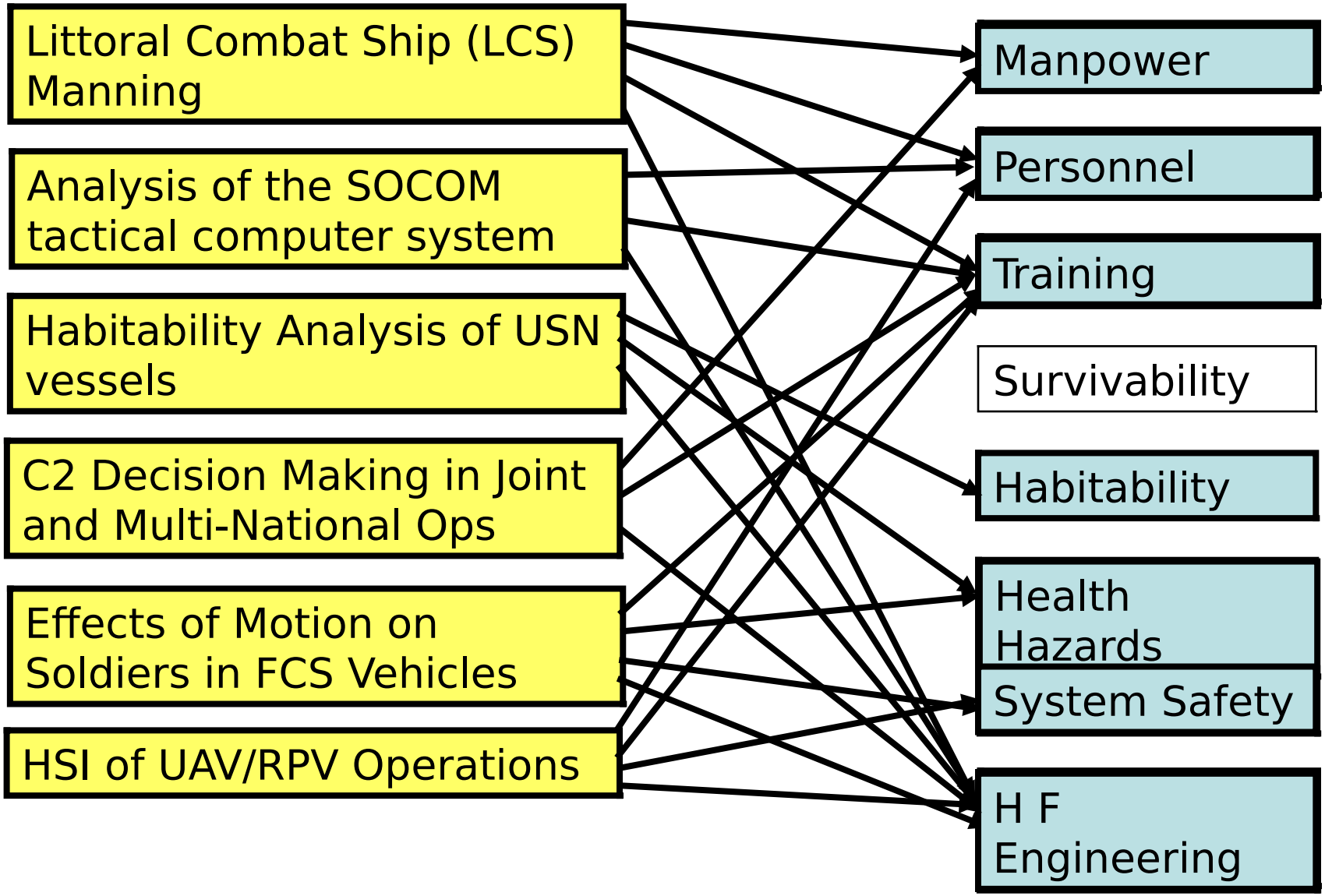
1. Describe and apply human performance theories and principles in the analysis and design of human systems.
2. Conduct research in laboratory and field settings; present findings both orally and in writing.
3. Apply human modeling capabilities to facilitate the analysis and design of human systems.
4. Synthesize and evaluate the domains of HSI in systems acquisition context.
5. Evaluate the political, organizational, social, and economic issues associated with integrating human-machine systems into organizations

Quarter 1 (Winter 2004)	Systems Engineering & Architecture	Research Methods for Performance Assessment	Algebra & Trigonometry	Systems Acquisition & Program Management[2]
Quarter 2 (Spring 2004)	Human Factors in System Design	Probability & Statistics[1]	Organizational Behavior	Human Resource Management
Quarter 3 (Summer 2004)	Individual Performance: Sensation, Perception & Cognition	Statistics & Data Analysis[1]	Test & Evaluation	Economic Analysis and Defense Resource Allocation
Quarter 4 (Fall 2004)	Survivability, Habitability, Environmental Safety and Occupational Health	Advanced Data Analysis[1]	Introduction to Probabilistic Modeling for HSI[1]	Training Foundations & Management
Quarter 5 (Winter 2005)	Team Performance & Decision Making	Human Factors in Virtual Environments[1]	Techniques in Manpower Modeling	Managing Planned Change in Complex Organizations
Quarter 6 (Spring 2005)	Skilled Operator Performance & Training Systems	Physically-based Modeling, Anthropometry & Biomechanics	6 week Experience Tour	6 week Experience Tour
Quarter 7 (Summer 2005)	Thesis Research	Thesis Research	Elective	Communications for Managers
Quarter 8 (Fall 2005)	Thesis Research	Thesis Research	Elective	Elective

Thesis Opportunities

- 6 week experience tour to sponsoring agency
- Potential sponsors include DoD and civilian locations
- Thesis tailored to meet sponsor’s needs and expertise and interest of advisor and student

Human Systems Integration



Current and Projected Theses

- Littoral combat ship (LCS) Manning
- Analysis of the Special Operations Command tactical computer system
- Habitability analysis for USN vessels: environmental considerations for berthing spaces
- Team Performance: C2 Decision making of commanders in joint and multi-national operations
- Effects of motion on performance of soldiers in FCS vehicles
- Human Systems Integration of UAV operations

NPS Faculty Participating in HSI

Schools:
GSOIS, GSEAS, GSBPP

Departments:

- Operations Research
- MOVES Institute
- Aviation Safety
- Systems Engineering
- Manpower
- Systems Management

- Prof Nita Lewis Miller
- Prof Michael McCauley
- Prof Rudy Darken
- Prof Sam Buttrey
- LCDR Laura Barton
- Prof Tony Ciavarelli
- Prof Jeff Crowson
- LTC Saverio Manago
- LTC Tom Cioppa
- Prof Alice Crawford
- Prof Steve Mehay
- LTC Gene Paulo
- Prof Mike Green

MS in HSI: Time and Financial Commitment

- Two year commitment
- Tuition cost: $3,250 quarter or $13 K/year

DL courses:

This fall, Introduction to Human Factors course is offered for first time

Who can attend NPS

- Active Duty Service Members
  US Army
  US Air Force
  US Navy
  US Marine Corps
  US Coast Guard
- Civilians working for DoD
- NPS Employees can take classes for free. Some programs hire students as Research Assistants.

PhD in HSI

1. Still in development
2. Leverage existing courses
3. Use existing graduate faculty and visiting faculty

If you build it, they will come!

Support for HSI

- Congressional
- DoD:
  - Navy Sponsorship:
    N1 has expressed strong interest
  - Students:
    Navy
    Army
    Air Force
  - Required by DoD Reg

NATIONAL DEFENSE AUTHORIZATION ACT
FOR FISCAL YEAR 2005

REPORT

OF THE

COMMITTEE ON ARMED SERVICES
HOUSE OF REPRESENTATIVES

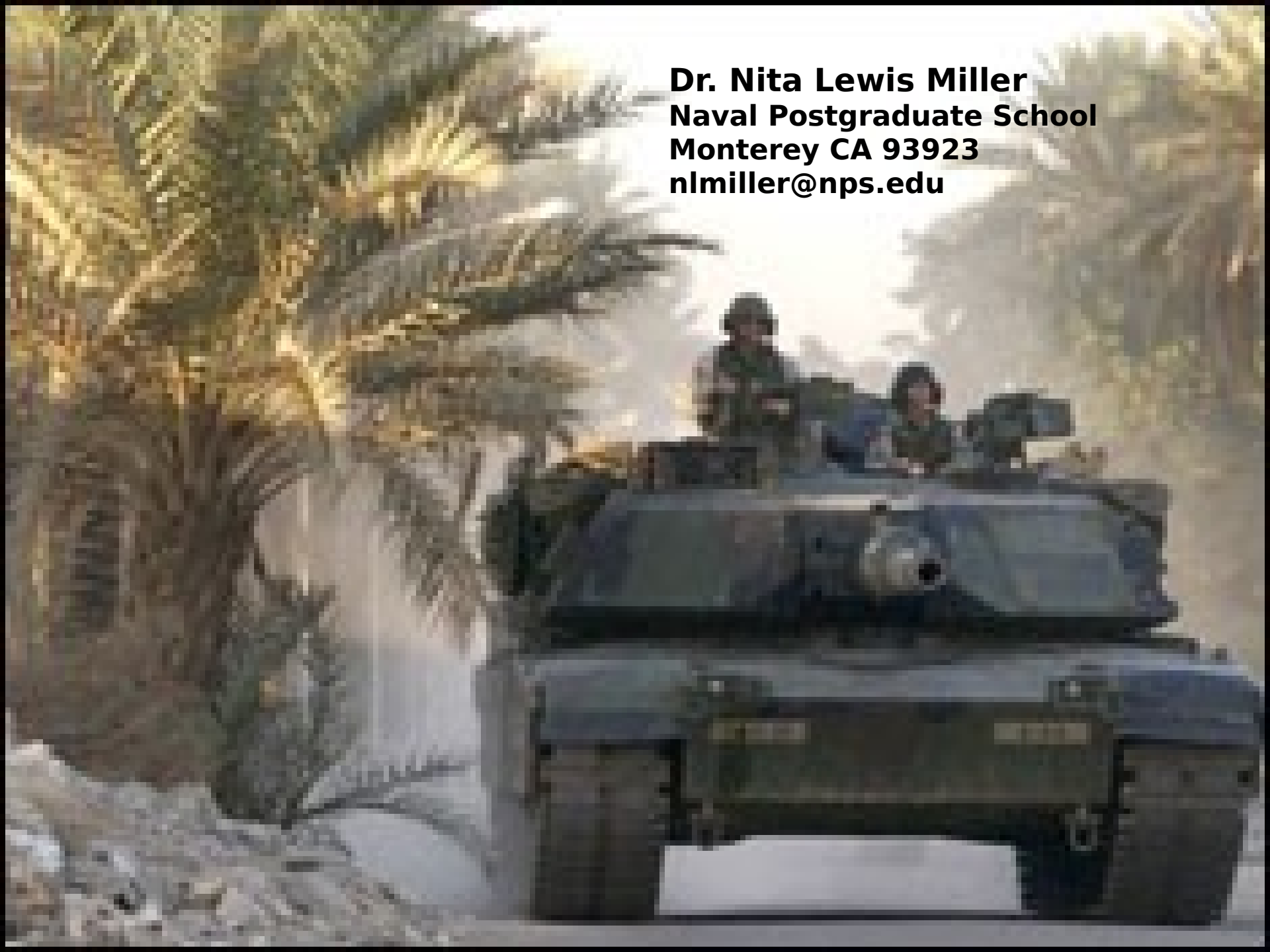
Human systems integration

The committee recognizes the need to consider human systems integration issues early in the development cycle. Too often, man-machine interface issues are not addressed until late in the development cycle after the configuration of a particular weapon or system has been set. What results is a degraded combat system that is not able to achieve its maximum performance and, at worst, becomes a liability on the battlefield.

The committee notes that all the military departments include some form of human systems integration in their development and acquisition process, but believes that institutionalization and standardization of human systems integration methodologies and modeling tools across the Department of Defense is desirable. To this end, the committee recommends that the Secretary of Defense conduct a comprehensive Department-wide review of the implementation of human systems integration in defense acquisition programs. Further, the committee recommends additional resources for human factors engineering initiatives in each of the military departments.

Summary

- HSI is the newest interdisciplinary academic field.
- There is congressional support – even a mandate – to implement HSI.
- There is a need in DoD for educated HSI professionals to support the congressional mandate.
- NPS is the HSI educational lead in the DoD and the nation.
- N1 has expressed strong interest in sponsorship.
- There are students – and cool projects!
- The next step is to populate programs with HSI-educated professionals.



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HSI Cohort 1

Quarter 1 (Winter 2004)	**SI 4001 (4-1) Systems Engineering & Architecture**	**OS3040 (3-0) Research methods, planning and execution**	**MA 1010 (5-0) Algebra and Trigonometry**	**MN3331 (5-1) Systems Acquisition & Program Management[2]**	**Friday Noon Seminar**	
Quarter 2 (Spring 2004)	**OA3401 (3-1) Human Factors in System Design**	**OS3111 (3-1) Probability & Statistics[1]**	**GB3010 (3-0) Organizational Behavior**	**MN3760 (3-0) Manpower Economics**	Friday hourly Seminar in HSI	
Quarter 3 (Summer 2004)	**OA4401 Sensation, Perception & Cognition**	**OS3112 (3-1) Statistics & Data Analysis[1]**	**OA4603 (4-0) Test and Evaluation**	**GB3012 (3-0) Communication Strategies for Effective Leadership**	Friday hourly Seminar in HSI	JPME (Optional)
Quarter 4 (Fall 2004)	**OA3402 Human Performance Measurement: Cognition & Ind. Perf.**	**OS3113 (3-1) Advanced Data Analysis[1]**	**OS3xxx Probabilistic Models[1]**	**MN4115 (4-0) Training Foundations & Management[2]**	Friday hourly Seminar in HSI	JPME (Optional)
Quarter 5 (Winter 2005)	**OA4403 (Spec Topics) Team Perf. & Decision Making**	**MV4001 (4-1) Human Factors in VE[1]**	**OA4701 (4-0) Techniques in Manpower Modeling**	**MN4125 (4-0) Managing Planned Change in Complex Organizations**	Friday hourly Seminar in HSI	JPME (Optional)
Quarter 6 (Spring 2005)	**OA4402 Skilled Operator Performance: Training Systems**	**OS4405 (3-1) Survivability, Habitability, Environment, Safety and Oc. Health[3]**	**6 week Experience Tour**	**6 week Experience Tour**	Friday hourly Seminar in HSI	JPME (Optional)
Quarter 7 (Summer 2005)	**OS 4001 (3-1) Human Modeling, Anthropometry & Biomechanics[3]**	**OA0810 Thesis Research**	**Elective**	**Elective**	Friday hourly Seminar in HSI	JPME (Optional)
Quarter 8 (Fall 2005)	**OA0810 Thesis Research**	**OA0810 Thesis Research**	**Elective**	**MN3111 (4-0) Personnel Management Processes**	Friday hourly Seminar in HSI	JPME (Optional)

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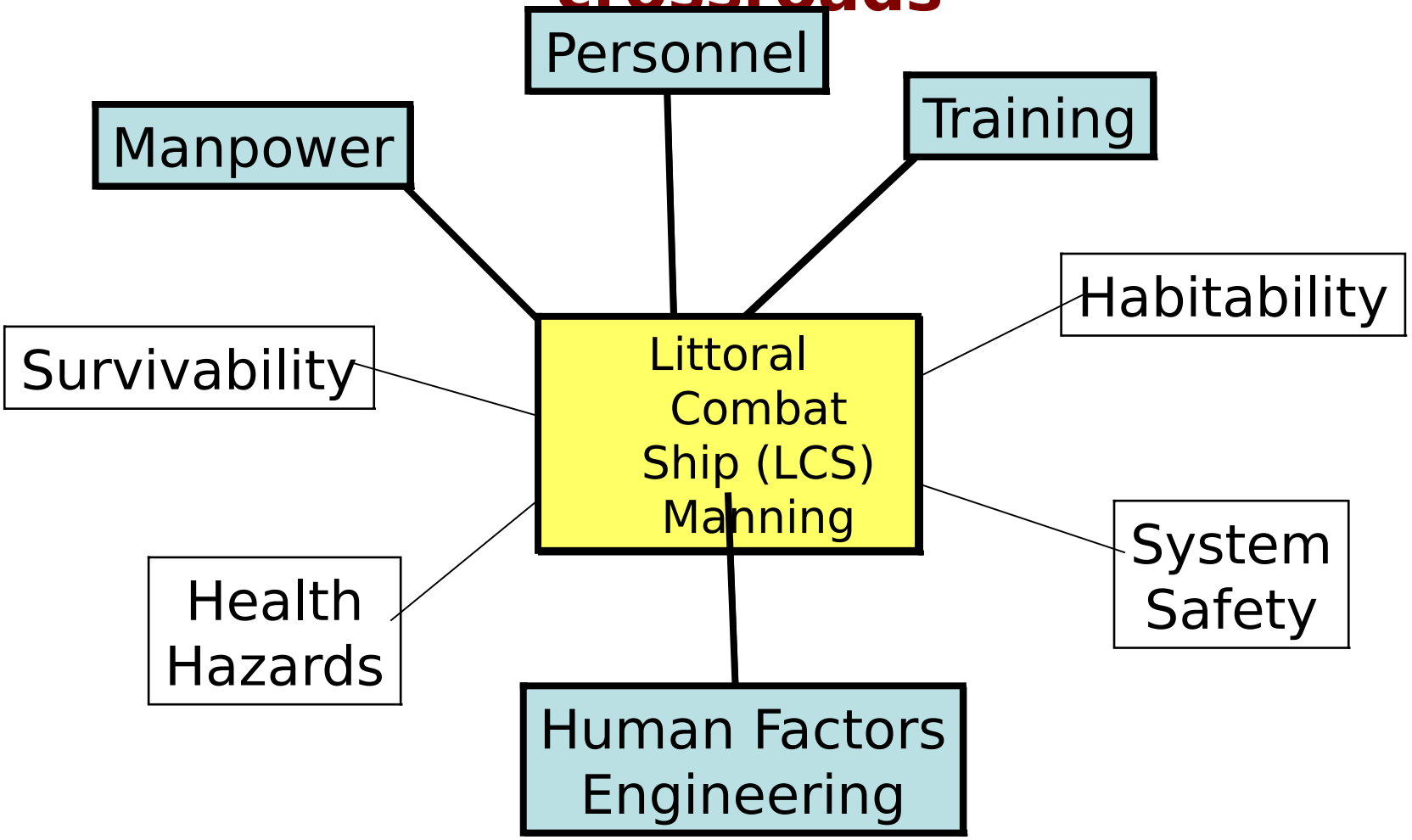

MS in HSI: Time and Financial Commitment

- Two year commitment
- Tuition cost: $3,250 quarter or $13 K/year

Certification in HSI

- Still in development; interest in several levels
- Leverage existing DL courses (currently Intro to Human Factors course offered this fall)
- Cost?